

North America, where these needs are more widely recognized than in most UK departments.

A review section explains what continuum mechanics is, about equations of motion, vectors and fluids. The topics covered include dimensional analysis, pressure and consolidation, flow through porous media, strain and elasticity, viscous fluids, flows of natural materials, turbulence and thermal convection. It is natural to draw comparisons, both in level and content, with Turcotte and Schubert's (1982) standard text on *Geodynamics*. Middleton and Wilcock generally pay greater attention to the problems related to fluid flow, and somewhat less to behaviours associated with rock, particularly its brittle behaviour. The levels of detail and presentation are, however, very similar. The target audience thus appears to be very well defined as earth surface scientists, including those concerned with rivers, although restriction to continuum mechanics limits application to particulate systems, such as those involved in bedload transport or movement on scree slopes. The book also provides some background material for atmospheric scientists, and for civil engineers on geotechnics, but in both cases there are texts which are more particularly focused.

Should you buy this book, or recommend it to students?

In terms of relevance and importance of its content, the answer is a very clear affirmative, but in many cases this must be qualified by the preparedness of many students for material at this level. Students with only 'A' level or high-school mathematics will almost certainly struggle with the relatively high-level approach, and only the most dedicated will survive the experience. This must raise the question of how we select and train our students in earth and environmental sciences and physical geography. If we are not able to bring at least some of our students up to a high level, by selecting at least some with a proper scientific background and providing them with challenging course material, we may condemn ourselves to playing a second-class role in the future development of our science.

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REFERENCES

- Turcotte, D. L. and Schubert, G. 1982. *Geodynamics: Applications of Continuum Physics to Geological Problems*, John Wiley & Sons, New York 450 pp.

VOLCANOES by A. Scarth, UCL Press, London, 1994. No. of pages: xiii + 273. Price: £40 (hb); £14.90 (pb). ISBN 1-85728-233-X (hb); 1-8582-224-8 (pb).

In recent years, several introductory texts on volcanoes have been published, and this recent work by Alwyn Scarth enters an already crowded market. Written from what the author claims to be a geographical perspective, the volume attempts to avoid jargon and concentrates instead on 'volcanoes as landscape features and the different impacts that their eruptions have had upon the landscape and the populations around them' (p. xi).

At one level, the aim of this volume to introduce volcanoes in a non-technical, jargon-free manner is fulfilled admirably and the author holds the reader's interest as he introduces volcanoes (Chapters 1 and 2); surveys global volcanic activity (Chapters 3–6); discusses volcanic landforms (Chapters 7–14); and reviews the progress made in the prediction of volcanic activity (Chapter 15). Alwyn Scarth writes with a fluent style, and his photographs and line drawings are of excellent quality and clearly reproduced. Examples and case studies are well chosen and wide-ranging, and the author uses information on historical as well as contemporary eruptions to good effect. It is, for instance, very pleasing to see the varied volcanic activity and landforms of the Azores, the Canary Islands and the Aegean rubbing shoulders with the more familiar examples from Italy and the American

west. The author's use of such a wealth of foreign-language source material — which is rarely reviewed in English — is to be greatly commended, since volcanology is becoming increasingly dominated by publications in English. For the general reader interested in visiting a volcanic region, this is a good introduction, the only concern being its high price even in paperback.

Although claimed to be for 'students of geography, the earth sciences and the environmental sciences' (preface), this book is not a suitable introductory volume for these groups. All teachers of the earth sciences welcome textbooks which are not only readable but which also interest, inspire and inform first-year students. Scarth's book, however, is actually oversimplified, and glosses over many important issues. For instance, the principal area in which progress has been made during the last two decades is in linking descriptive volcanology to physical processes. Research by a distinguished cast list, which includes G. P. L. Walker, R. S. J. Sparks, K. Wohletz, G. Heiken and many others, has been instrumental in bringing this about. By divorcing the descriptive study of volcanoes from an equally high-level study of processes, Scarth fails to allow the student to explore this important and stimulating research frontier adequately. Much of the recent literature is cited in the selections of 'further reading' (pp. 260–261), but by not focusing it directly on his excellent landform descriptions, Scarth fails to exploit the potential of his volume as an introductory student text. Furthermore, the decision not to include direct reference citations because of space

constraints, but rather to provide 'further reading', is a mistake, since the student reader has no idea where to find further information on a particular topic. One example suffices to make the point. In Chapter 7, the author provides a first-rate description of the geomorphology of *aa* and *pahoehoe* lava flows, but by not tying this closely to the theoretical, process-based studies of D. W. Peterson, R. I. Tilling and C. R. J. Kilburn he fails to demonstrate how knowledge of these flow types has improved through the linking of descriptive studies with more process-based, theoretical studies. Without citation of relevant texts and papers, a full understanding

of the geomorphology of lava flows is extremely difficult for a student to achieve using the reading list at the end of the book.

Overall, this is an excellent book to whet the appetite, and the enthusiasm of the author for his topic shines through on every page. For the general reader and as a library purchase it is highly recommended, but for student purchase it is of much more limited value.

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COLD CLIMATE LANDFORMS edited by David J. A. Evans, Wiley, Chichester, 1994. No. of pages: xvi + 526. Price: £95.00. ISBN 0-471-94043-7.

This is the first in a promised series of *Classic Papers in Translation* that will seek to address the ignorance of English-speaking geomorphologists with regard to geomorphological literature published in other European languages. The book includes 21 papers, of which 17 relate to periglacial landforms and the reconstruction of Quaternary periglacial climates, leaving a mere four papers concerned with glacial landforms and deposits. This imbalance certainly reflects the significance of periglacial geomorphological research in central and eastern Europe, but one is forced to question the purpose of including these few glacial papers here, significant though they may be. A separate volume doing justice to the non-Anglophone contribution to glacial geomorphological literature might have offered a more satisfactory solution.

The book is arranged in seven short sections: permafrost landforms and regional reconstructions (five papers); periglacial landforms (six papers); glacial and fluvioglacial landforms (four papers); marine and lacustrine landforms (two papers); polygenetic landforms (one paper on saprolites); cold climate slopes (two papers); and rock glaciers (one paper). Each translation is prefaced by an excellent editor's review, in which inclusion is justified in terms of significance to subsequent research or, in some cases, neglect by later researchers. The inclusion of these comments increases the value of the volume enormously to both teachers and students.

Inevitably, any assessment of the significance of particular papers depends on the interests and experience of the reviewer. Certainly, David Evans has included many seminal works, including Poser's 1948 reconstruction of European climate during the last glacial stage, the

description of relict ground ice phenomena by Pissart (1963), the discussion of frost weathering and introduction of the term 'periglacial' by Lozinski (1909), the fascinating and perceptive paper by Sørensen (1935) on mechanisms of solifluction and the formation of patterned ground, Tricart's (1956) experimental study of frost weathering, the review of drumlin formation by Czechówna (1953) and the study of rock glaciers by Barsch (1969). The inclusion of more recent works, notably that of Bertran *et al.* (1992) on the formation of grèze litées, illustrates well a theme that runs through most of the papers collected here, i.e. the importance of understanding processes before attempting to interpret the palaeoclimatic significance of landforms and deposits. Only time will tell in judging the relative importance of these recent papers to the overall development of cold climate geomorphology.

The major omission from this volume is some representation of the extensive Russian literature on geocryology and permafrost phenomena. The editor justifies this omission by reference to alternative sources of Russian translations, but the absence of papers on modern permafrost processes is a weakness, and reflects a European preoccupation with relict periglacial phenomena that contrasts with the focus of North American research. The book provides a useful compilation of papers, some of historical rather than scientific interest, but others providing valuable insights into cold climate landforms and processes. At £95 this volume is expensive, and only the most committed individuals are likely to buy. It should, however, find a place on the library shelves of all universities where advanced courses in cold climate geomorphology are offered.

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